Alg. 2 Warm Up #11-5

Describe what you can about each graph looking at its equation. Graph it as accurately as possible without using a graphing calculator.

1. $y = 0.5(x - 2)(x + 3)^2$

2. $y = -2x(x + 4)^3$

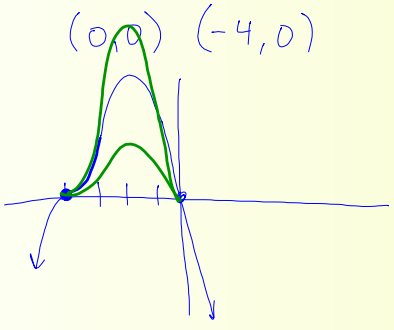
Rt side down

4th degree → Same end behavior

as $x \to \infty$, $f(x) \to -\infty$ (Rt side) (down)

as $x \to -\infty$, $f(x) \to -\infty$ (left side)

(0,0) (-4,0)



HW Questions:

12-18. Factor and reduce the rational expression $\frac{5x+10}{x^2+6x+8}$. Justify each step.

12-19. Solve each equation.

a. $\sqrt{x+7}+5=x$

$(\sqrt{x+7})^2 = (x-5)^2$

$x + 7 = x^2 - 10x + 25$

$0 = x^2 - 11x + 18$

$0 = (x-9)(x-2)$

$x = 9, \cancel{2}$

b. $\frac{a}{a^2-36}+\frac{2}{a-6}=\frac{1}{a+6}$

HW Questions:

12-18. Factor and reduce the rational expression $\frac{5x+10}{x^2+6x+8}$. Justify each step.

12-19. Solve each equation.

a. $\sqrt{x+7}+5=x$

b. $\frac{a}{a^2-36}+\frac{2}{a-6}=\frac{1}{a+6}$

$(a+6)(a-6)\left(\frac{a}{(a+6)(a-6)}+\frac{2}{(a-6)}\right)=\frac{1}{(a+6)}(a+6)(a-6)$

$a+2(a+6)=a-6$

12-20. Change the angle measures below from radians to degrees or degrees to radians.

a. $108°$ b. $320°$ c. $\frac{7\pi}{9}$

d. $\frac{19\pi}{12}$ e. $\frac{17\pi}{2}$ f. $260°$

$(a+b)^3=a^3+3a^2b+3ab^2+b^3$

$(2m+5)^3=(2m)^3+3(2m)^2(5)+3(2m)(5)^2+5^3$

$=8m^3+60m^2+150m+125$

12-22. Expand.

a. $(a+b)^3$

b. $(2m+5)^3$ apply the pattern above !!

12-43. Solve each equation for $0^\circ \le \theta \le 360^\circ$, or if you prefer, $0 \le \theta \le 2\pi$. You may need your calculator, but remember that it only gives *one* answer.

a. $\sin(\theta) = 0.5$

b. $\cos(\theta) = -0.5$

c. $4\tan(\theta) - 4 = 0$

$+4 \quad +4$

$\frac{4\tan\theta}{4} = \frac{4}{4}$

$\tan\theta = 1$

$\theta = \frac{\pi}{4}, \frac{5\pi}{4}$

d. $\frac{3\sin^2(\theta)}{3} = \frac{1}{3}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{1}{3}}$

$\sin\theta = \pm\frac{1}{\sqrt{3}}$

$\theta = \sin^{-1}\left(\frac{1}{\sqrt{3}}\right) \quad \theta = \sin^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

$\theta \approx 35.3^\circ \quad \theta \approx -35.3^\circ$

Quad I $\rightarrow \theta \approx 35.3^\circ$

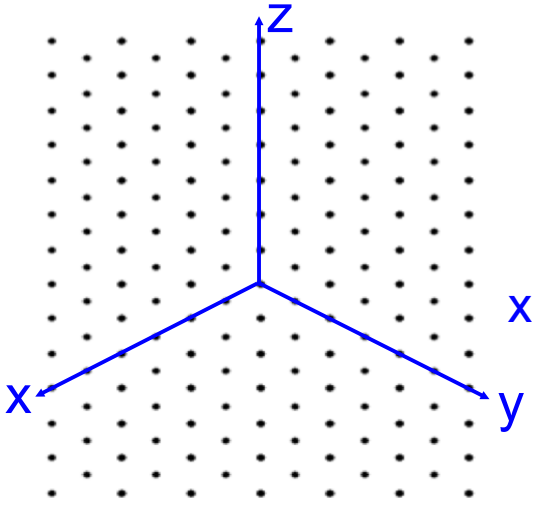
Quad II $\rightarrow 180 - 35.3^\circ \approx 144.7^\circ$

Quad III $\rightarrow 180 + 35.3^\circ \approx 215.3^\circ$

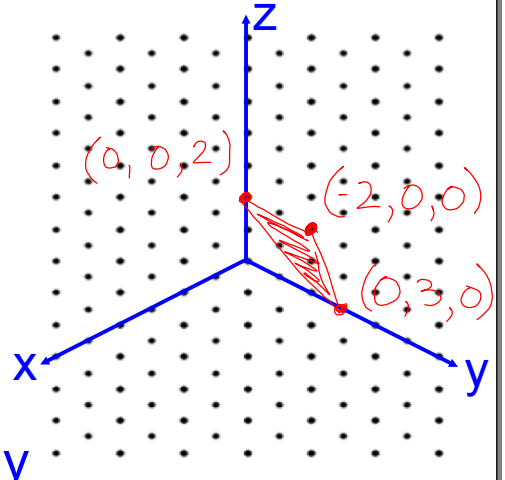
Quad IV $\rightarrow 360 - 35.3^\circ \approx 324.7^\circ$

12-46. Graph.

a. $(-2, 3, -2)$



b. $3x - 2y - 3z = -6$



12-53. For each of the following problems, find all of the solutions without using a calculator. Use a graph or unit circle to support your answers. Then predict the solution that your calculator will give and use your calculator to check your prediction.

a. $4\sin(x)+2=0$

b. $2\cos(x)=\sqrt{3}$

c. $\tan(x)+1=0$

d. $4\cos^2(x)-4=0$

12-56. Rewrite each sum below as a single expression.

a. $\frac{1}{2}+\frac{1}{3}$

b. $\frac{x}{x}\cdot\frac{3}{2x}+\frac{4}{x^2}\cdot\frac{2}{2}$

c. $\frac{x}{x+1}+\frac{3}{x-1}$

d. $\frac{\sin\theta}{\cos\theta}+\frac{1}{\sin\theta}$

$\frac{(x-1)}{(x-1)}\cdot\frac{x}{x+1}+\frac{3}{x-1}\cdot\frac{(x+1)}{(x+1)}$

$\frac{x^2-x+3x+3}{(x-1)(x+1)}$

$\frac{x^2+2x+3}{(x-1)(x+1)}$

$\frac{\sin\theta}{\sin\theta}\cdot\frac{\sin\theta}{\cos\theta}+\frac{1}{\sin\theta}\cdot\frac{\cos\theta}{\cos\theta}$

$\frac{\sin^2\theta+\cos\theta}{\sin\theta\cos\theta}$

Review & Preview

8-8. For each equation below, make tables that include x-values from –2 to 2 and draw each graph.

$y=x^3$

a. $y=(x-1)^2(x+1)$

b. $y=(x-1)^2(x+1)^2$ $y=x^4$

c. $y=x^3-4x$

$y=x(x^2-4)$

$y=x(x+2)(x-2)$

d. What are the parent functions for these equations?

8-88. Raul claims that he has a shortcut for deciding what kind of roots a function has. Jolene thinks that a shortcut is not possible. She says you just have to solve the quadratic equation to find out. They are working on $y=x^2-5x-14$.

Jolene says, *"See, I just start out by trying to factor. This one can be factored $(x-7)(x+2)=0$, so the equation will have two real solutions and the function will have two real roots."*

"But what if it can't be factored?" Raul asked. *"What about $x^2+2x+2=0$?"*

"That's easy! I just use the Quadratic Formula," says Jolene. *"And I get... let's see... negative two plus or minus the square root of... two squared... that's 4... minus... eight..."*

"Wait!" Raul interrupted. *"Right there, see, you don't have to finish. 2^2 minus $4\cdot2$, that gives you –4. That's all you need to know. You'll be taking the square root of a negative number so you will get a complex result."*

"Oh, I see," said Jolene. *"I only have to consider part of the solution, the inside of the square root."*

Use Raul's method to tell whether each of the following functions has real or complex roots without completely solving the equation. Note: Raul's method is also summarized in the Math Notes box for this lesson.

a. $y=2x^2+5x+4$

b. $y=2x^2+5x-3$

$$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$ ← discriminant

8-89. Sketch the graphs and find the area of the intersection of the inequalities below.

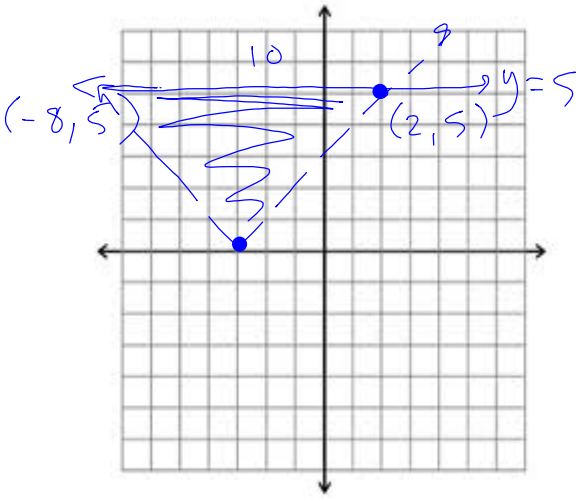
$y > |x+3|$

$y \leq 5$

$\Delta h = 5$

$\Delta b = 10$

$A = \frac{1}{2}bh$



8-90. Consider this geometric sequence: $i^0, i^1, i^2, i^3, i^4, i^5, \ldots, i^{15}$.

a. You know that $i^0 = 1$, $i^1 = i$, and $i^2 = -1$. Calculate the result for each term up to i^{15}, and describe the pattern.

b. Use the pattern you found in part (a) to calculate i^{16}, i^{25}, i^{39}, and i^{100}.

c. What is i^{4n}, where n is a positive whole number?

d. Based on your answer to part (c), simplify i^{4n+1}, i^{4n+2}, and i^{4n+3}.

e. Calculate i^{396}, i^{397}, i^{398}, and i^{399}.

$\sqrt{-1} = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

b) $i^{25} = (i^4)^6 \cdot i$

$i^{25} = i$

c) $(i^4)^n = 1$

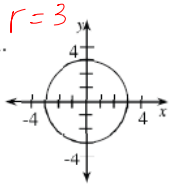
d) $i^{4n+1} = i^{4n} \cdot i^1$

$= i$

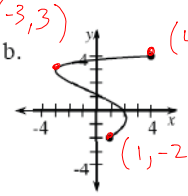
practice:

State the domain and range for each graph below. Then state whether or not it is a function.

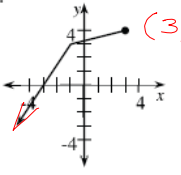
a. r = 3



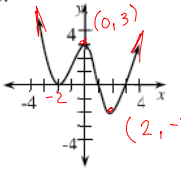
b. (-3,3) (4,4) (1,-2)



c. (3,4)



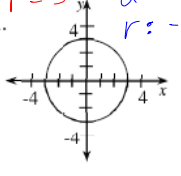
d. (0,3) (2,-2)



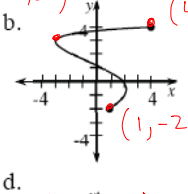
practice:

State the domain and range for each graph below. Then state whether or not it is a function.

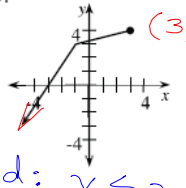
a. r = 3 d: $-3 \le x \le 3$ r: $-3 \le y \le 3$



b. (-3,3) (4,4) (1,-2) d: $-3 \le x \le 4$ r: $-2 \le y \le 4$



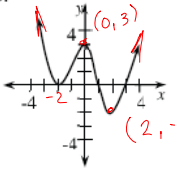
c. (3,4)



d: $x \le 3$

r: $y \le 4$

d. (0,3) (2,-2) d: $x = \mathbb{R}$ r: $y \ge -2$



HW: 8 - # 91, 94 - 96, 127,

128, 142, 144 - 146, 151,

152, 155, 158, 161, 164